

NAME	ENERGY LEVEL	ABSORBER THICKNESS
Optical	.1-10 eV	.001-0.5 mm
Ultra Violet	10-100	.05-.3 μ m
X-ray	100 eV-20 keV	.3-5 μ m
Gamma	>20 KeV	>5 μ m

12. A field-effect transistor, with possibly a matching transformer, may also be used as an electrical read-out of the NIS junction.

13. Arrays of absorbers and tunnel junctions may be used to obtain positional information and to increase the area of the absorber. The tunnel junctions may be connected in parallel and then connected to a single SQUID in order to read-out all the detectors with a single SQUID amplifier.

14. When an NIS junction is biased at voltages below the superconducting gap, the electrons in the normal metal base are cooled. This occurs because only hot electrons above the fermi energy of the metal of base layer B can tunnel out of the base layer B. This junction may thus be used as a refrigeration means.

15. FIG. 4 shows a further enhancement to the base layer 40, where the rest of the particle calorimeter is not shown. Ridges of base layer 41 has a greater thickness of metal than base layer 40. These ridges function to increase the thermal conductivity of heat through the base layer without greatly increasing its heat capacity.

Although the present invention has been described with reference to preferred embodiments, numerous modifications and variations can be made and still the result will come within the scope of the invention. No limitation with respect to the specific embodiments disclosed herein is intended or should be inferred.

I claim:

1. A particle calorimeter functioning to measure the energy of a particle comprising:

a particle absorber layer superimposed upon a base layer thereby providing an efficient heat transfer between the absorber and base layers;

said particle absorber layer further comprising a composition selected from the group consisting of normal metals, insulators, semi-metals, and super-conductors;

a means for measuring a temperature change in the base layer, wherein the temperature change functions to detect the particle energy striking the particle absorber layer;

said base layer further comprising a composition selected from the group consisting of normal metals not in a superconducting state;

said particle calorimeter having an ambient environment comprising a cryogenic temperature; and

said base layer further comprising a means for providing a weak thermal contact with a super cold substrate, functioning to enable the base layer to react to minute temperature changes to incoming particles.

2. The particle calorimeter of claim 1, wherein the means for providing a weak thermal contact further comprise a thinning of the super cold substrate into a membrane beneath the base and particle absorber layers.

3. The particle calorimeter of claim 2 wherein the membrane further comprises a composition of silicon nitride having a thickness of 0.1 to 1 micron.

4. The particle calorimeter of claim 1 further comprising a first superconducting lead D connected to the base layer, thereby forming a superconductor-normal metal (SN) contact, functioning to thermally insulate the base layer while allowing electrical contact through the first superconducting lead.

5. The particle calorimeter of claim 4 wherein the means for measuring a temperature change in the base further comprises a second superconducting lead E superimposed beneath an insulating layer which insulating layer is superimposed beneath the base layer, thereby forming a normal metal-insulator superconductor (NIS) junction which generates a current in proportion to the temperature change in the base.

6. The particle calorimeter of claim 5 further comprising a normal metal lead forming a normal metal-superconductor (NS) junction with the second superconducting lead of the NIS junction, functioning to absorb the heat of quasi particles produced at the NIS junction away from the absorber, base layer and superconducting lead.

7. The particle calorimeter of claim 5 further comprising a SQUID functioning to measure the current generated by the NIS junction.

8. The particle calorimeter of claim 5 further comprising a plurality of NIS junction(s) each superimposed beneath the insulating layer and each generating a current, thereby enabling a calculation of a strike position on the absorber and a total energy calculation of the particle.

9. A particle calorimeter of claim 5, wherein said NIS junction further comprises a refrigeration means for the base layer functioning to transmit hot electrons from the base layer through the NIS junction.

10. The particle calorimeter of claim 4 further comprising a second SN contact, wherein a calibrating pulse of heat can be obtained by creating a current with zero average flowing through the two SN contacts and the base layer.

11. The particle calorimeter of claim 4 wherein the means for measuring temperature change in the base layer further comprises a second superconducting lead operating at a superconducting - non-superconducting transition temperature.

12. The particle calorimeter of claim 1 wherein the cryogenic temperature further comprises a temperature in the range of 0.01 kelvin to 1 kelvin.

13. The particle calorimeter of claim 1 wherein the particle further comprises an x-ray photon and wherein the absorber layer further comprises a thickness of approximately 0.25 to 10 microns, and an area of approximately 1 mm².

14. The particle calorimeter of claim 1 wherein the particle further comprises an x-ray photon and wherein the base layer further comprises a thickness of 0.02-0.1 micron, and an area of approximately 1 mm².

15. The particle calorimeter of claim 1 wherein the base layer further comprises ridges functioning to conduct heat faster without greatly increasing heat capacity.

16. The particle calorimeter of claim 1 wherein the particle absorber layer further comprises a thickness ranging from 0.001 micron to 50 microns, thereby enabling the measurement of a particle energy level ranging from 0.1 eV to >20 KeV.